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

Question Paper Code : 51404

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2014.

Fifth Semester

Electronics and Communication Engineering

EC 2302/EC 52 — DIGITAL SIGNAL PROCESSING

(Regulation 2008)

(Common to PTEC 2302 – Digital Signal Processing for B.E. (Part-Time) Fourth Semester, Electronics and Communication Engineering – Regulation 2009)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the difference between DFT and DTFT.

2. What is Bit Reversal?

3. Sketch the frequency response of an odd and an even order Chebyshev low pass filters.

4. What is bilinear transformation? What is the main advantages and disadvantages of this technique?

5. State the effect of having abrupt discontinuity in frequency response of FIR filters.

6. State Gibb's phenomenon.

7. State the need for scaling in filter implementation.

8. What is product round-off noise?

9. Write the need for decimation.

10. What is meant by multirate signal processing?

PART B — (5 × 16 = 80 marks)

11. (a) Explain in detail about overlap add method and overlap save method for filtering of long data sequences using DFT. (16)

Or

(b) Develop a 8 point DITFFT algorithm. Draw the signal flow graph. Determine the DFT of the following sequence.

$x(n) = \{1, 1, 1, 1, 0, 0, 0, 0\}$ using the signal flow graph. Show all the intermediate results on the signal flow graph. (16)

12. (a) Design a low pass Butterworth digital filter with the following specifications :

$W_S = 4000$, $W_P = 3000$

$A_P = 3\,\text{dB}$, $A_S = 20\,\text{dB}$, $T = 0.0001$ sec. (16)

Or

(b) A system is represented by a transfer function $H(z)$ is given by

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

(i) Does this $H(z)$ represent a FIR or IIR filter why? (4)

(ii) Give a difference equation realization of this system using direct form – I. (6)

(iii) Draw the block diagram for the direct form II canonic realization, and give the governing equations for implementation. (6)

13. (a) Explain the designing of FIR filters using frequency sampling method. (16)

Or

(b) (i) State and explain the properties of FIR filters. State their importance. (8)

(ii) Explain linear phase FIR structures. What are the advantages of such structures? (8)

14. (a) (i) Explain the characteristics of limit cycle oscillation with respect to the system described by the difference equation :

$y(n) = 0.95\, y(n-1) + x(n)$;

$x(n) = 0$ and $y(-1) = 13$.

Determine the dead band range of the system. (10)

(ii) Explain the effects of coefficient quantization in FIR filters. (6)

Or

(b) (i) Derive the signal to quantization noise ratio of A/D converter. (6)

(ii) Compare the truncation and rounding errors using fixed point and floating point representation. (10)

15. (a) Explain in detail about the polyphase implementation of FIR filters for interpolator and decimators. (16)

Or

(b) (i) Write notes on the following :

(1) Over sampling A/D converter.

(2) Over sampling D/A converter. (10)

(ii) State the various applications of multirate signal processing. (6)
