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

Question Paper Code : 50444

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017
Fifth/Sixth Semester
Electronics and Communication Engineering
EC6502 – PRINCIPLES OF DIGITAL SIGNAL PROCESSING
(Common to : B.E. Biomedical Engineering/Medical Electronics)
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. What is twiddle factor ?
2. State and prove periodicity property of DFT.
3. List the different types of filters based on frequency response.
4. What are the properties of bilinear transformation ?
5. Write the steps involved in FIR filter design.
6. Draw the block diagram representation of FIR system.
7. Compare the fixed point and floating point number representations.
8. What is meant by finite word length effects in digital system ?
9. Write the input output relationship for a decimator.
10. State the applications of adaptive filtering.

PART – B **(5×13=65 Marks)**

11. a) Find the 8 point DFT of the sequence $x(n) = \{2, 2, 2, 2, 1, 1, 1, 1\}$ using Decimation in Time FFT algorithm.

(OR)

b) Determine the circular convolution of the sequences $x_1(n) = \{1, 2, 3, 1, 1, 2, 3, 1\}$ and $x_2(n) = \{4, 3, 2, 2, 2, 2, 3, 4\}$ using DFT and IDFT.

12. a) Enumerate the steps for IIR filter design by impulse invariance with an example.

(OR)

b) Analyze the design of discrete time IIR filter from analog filter.

13. a) Design a FIR filter with the following desired specifications, using Hanning window with N = 5.

$$H_d(e^{j\omega}) = \begin{cases} 0, & -\frac{\pi}{4} \le \omega \le \frac{\pi}{4} \\ e^{-j2\omega}, & -\frac{\pi}{4} \le |\omega| \le \pi \end{cases}$$

(OR)

b) Explain the design procedure of FIR filter using frequency sampling method.

14. a) Explain the quantization process and errors introduced due to quantization.

(OR)

b) 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 $y(-1) = 13$. **(8)**

ii) Define zero input limit cycle oscillation and explain. **(5)**

15. a) How does the sampling rate increase by an integer factor I ? Derive the input-output relationship in both time and frequency domains.

(OR)

b) Discuss in detail about any two applications of adaptive filtering with necessary diagrams.

PART – C **(1×15=15 Marks)**

16. a) Obtain the direct form I, direct form II and cascade form realization of the following system function
$y(n) = 0.1\, y(n-1) + 0.2\, y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2)$.

(OR)

b) Convert the given analog transfer function $H(s) = \frac{1}{s+a}$ into digital transfer function by impulse invariant method.