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

Question Paper Code : 21453

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Fifth Semester

Electronics and Communication Engineering

EC 2302/EC 52 — DIGITAL SIGNAL PROCESSING

(Regulations 2008)

(Common to PTEC 2302 – Digital Signal Processing for B.E. (Part–Time) Fourth Semester – ECE —Regulations 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. Distinguish between Butterworth and Chebyshev filter.
4. What is prewarping?
5. State the properties of FIR filter.
6. Give the desirable characteristics of the window.
7. What is meant by fixed point arithmetic? Give example.
8. Explain the meaning of limit cycle oscillator.
9. What is anti-imaging filter?
10. Give the applications of multi–rate DSP.

PART B — (5 × 16 = 80 marks)

11. (a) (i) State the following properties of DFT.

(1) Time reversal

(2) Parsavel's theorem. (8)

(ii) Perform the linear convolution of the given sequences $x(n) = \{1,-1,1,-1\}$, $h(n) = \{1,2,3,4\}$ using DFT method. (8)

Or

(b) Derive the butterfly diagram of 8 point radix–2 DIF–FFT algorithm and fully label it.

12. (a) Explain the butterworth filter approximation. (16)

Or

(b) Explain the bilinear transform method of IR filter design. What is warping effect? Explain the poles and zeros mapping procedure clearly. (16)

13. (a) (i) A low pass filter has the desired response as given below

$$H_d(e^{j\omega}) = \begin{cases} e^{-j3\omega}, & 0 \le \omega < \dfrac{\pi}{2} \\ 0, & \dfrac{\pi}{2} \le \omega \le \pi \end{cases}$$

Determine the filter coefficients $h(n)$ for M = 7, using type-1 frequency sampling technique. (10)

(ii) What is a linear phase filter? What are the conditions to be satisfied by the impulse response of an FIR system in order to have a linear phase? (6)

Or

(b) Design a bandpass filter which approximates the ideal filter with cut off frequencies at 0.2 rad / sec and 0.3 rad / sec. The filter order is M = 7. Use the Hanning window function. (16)

14. (a) (i) Discuss the various common methods of quantization. (8)

(ii) Explain the finite word length effects in FIR digital filters. (8)

Or

(b) Describe the quantization in floating point realization of IIR digital filters. (16)

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

Or

(b) (i) Describe 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)