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

L 1291

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

Sixth Semester

Mechatronics Engineering

EE 351 — DIGITAL SIGNAL PROCESSING

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is analog signal?

2. List the limitations of digital signal processing.

3. What is discrete time system?

4. What is the relationship between Z- Transform and Discrete Fourier Transform?

5. What is radix -2 FFT?

6. Find Fourier transform of a sequence,

$x(n) = 1; -2 \leq n \leq 2$

$= 0$; otherwise

7. Write the characteristics of ideal filter.

8. State sampling theorem.

9. What are the advantages of FIR filter over IIR filter?

10. Name the design techniques used for IIR filter?

PART B — (5 × 16 = 80 marks)

11. (a) Discuss the merits and demerits of DSP over ASP. Also discuss the applications of DSP. (16)

Or

(b) With examples, explain various classes of signals with its characterization. (16)

12. (a) (i) What are linear and time invariant systems? Give examples. (6)

(ii) Find whether the following system is (10)

Linear and stable

$$y(n) = \sum_{k=-\infty}^{n} x(k+3).$$

Or

(b) Find the Z- Transform and ROC of the following discrete time signals

(i) $x(n) = u(n-2)$ (8)

(ii) $x(n) = (1/2)^{n-1}\, u(n-1)$ (8)

13. (a) (i) Find the Fourier transform of the following. (6)

$x(n) = (1/2)^{n-1}\, u(n-1)$

(ii) Discuss the properties of DFT. (10)

Or

(b) Find 8- point DFT of the following sequence using DIF Radix-2 algorithm $X(k) = \{1, 2, 3, 4, 4, 3, 2, 1\}$.

14. (a) Discuss the process of converting analog to digital in terms of sampling, quantization and coding in detail.

Or

(b) Write detailed notes on the followings

(i) Flash A/D Converter. (8)

(ii) Weighted resistor D/A Converter. (8)

15. (a) (i) Distinguish between FIR and IIR filters. (8)

(ii) Explain various types of IIR filter structures. (8)

Or

(b) Determine the filter coefficients of FIR filter using Hamming window with a frequency response $H_d\left(e^{j\omega}\right) = 1\,;\ \pi/4 \le |\omega| \le \pi$
$= 0\,;\ |\omega| \le \pi/4$
