C 20558 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, JUNE 2006

EC/AI/IC 2K 604—DIGITAL SIGNAL PROCESSING

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

I. (a) State and prove any one property of DFS.

(b) (i) What is twiddle factor ? Explain. (2 marks)

(ii) Draw the basic butterfly diagram for decimation-in-time radix-2 FFT algorithm and explain. (3 marks)

(c) Draw the FIR linear phase and cascade realization of the system function

$$H(z) = \left(1 + \frac{1}{2}z^{-1} + z^{-2}\right)\left(1 + \frac{1}{4}z^{-1} + z^{-2}\right).$$

(d) Explain about zero-input limit cycle oscillations.

(e) Describe bilinear transformation mapping technique.

(f) Explain the design procedure of FIR filter using window function.

(g) Compare TMS 320 family with ADSP 2100 family.

(h) Explain about general purpose digital signal processor.

(8 × 5 = 40 marks)

II. (a) State and prove convolution property of DFT.

Or

(b) Using decimation-in-time radix-2 FFT algorithm evaluate the 8-point DFT of $x(n) = \{1, -1, 1, -1, 2, -2, 2, -2\}$.

III. (a) Draw the cascade and parallel realizations for the following system function :

$$H(z) = \frac{1 + \frac{1}{4}z^{-1}}{\left(1 + \frac{1}{2}z^{-1}\right)\left(1 + \frac{1}{2}z^{-1} + \frac{1}{4}z^{-2}\right)}.$$

Or

(b) Explain quantization in floating point realization of IIR digital filters.

Turn over

IV. (a) Design a digital Butterworth filter to meet the following constraints :

$$\frac{1}{\sqrt{2}} \leq |H(w)| \leq 1, \text{ for } 0 \leq w \leq 0.2\pi$$

$$0 \leq |H(w)| \leq 0.1, \text{ for } 0.5\pi \leq w \leq \pi$$

using impulse invariant mapping.

Or

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

V. (a) Explain about :

(i) Pipelining.

(ii) Hardware multiplier.

(7 + 8 = 15 marks)

Or

(b) Explain the architecture of TMS 320 C 50 DSP processor with neat block diagram.

[4 × 15 = 60 marks]