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Name.....

Reg. No.....

SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2008

EE 2K 702/PTEE 2K 602—DIGITAL SIGNAL PROCESSING

Time : Three Hours Maximum : 100 Marks

I. (a) What is BIBO stability ? Give an example.

(b) State and prove convolution theorem in relation to Fourier transform.

(c) State the computational requirements of FFT.

(d) Show that the DFT of a sequence $x(n)$ is purely imaginary and odd if the sequence $x(n)$ is real and odd.

(e) Enumerate the difference between the fixed point and floating point processors.

(f) Briefly explain the Lattice structures.

(g) What is the Impulse invariant technique ?

(h) What are the drawbacks of direct form IIR filters ?

(8 × 5 = 40 marks)

II. (a) Determine whether the following systems are liner :

(i) $\frac{dy(t)}{dt} + 5y(t) + 2 = x(t)$

(ii) $5\frac{dy(t)}{dt} + y(t) = 5x(t)$

(iii) $\frac{dy(t)}{dt} + y(t) + 5 = 10x(t)$.

Or

(b) State the properties of Fourier transform.

III. (a) (i) Compute the DFT coefficients of a finite duration sequence (0, 1, 2, 3, 0, 0, 0, 0).

(ii) Compute the DFT of the sequence $x(n) = a^n$, where N = 8 and $a = 3$.

Or

(b) Explain how you would use the FFT algorithm to compute the IDFT.

Turn over

IV. (a) Explain in detail about the discrete state variables.

Or

(b) Explain the architecture of a fixed point dsp processor.

V. (a) Convert the analog filter to a digital filter whose system function is $H(s) = \frac{36}{(s + 0.1)^2 + 36}$.

The digital filter should have a resonant frequency of $w_r = 0.2\pi$. Use Impulse Invariant mapping.

Or

(b) Analyse truncation and round-off processes in binary number representations.

(4 × 15 = 60 marks)