C 28725 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
JUNE 2012

EC 04 602—DIGITAL SIGNAL PROCESSING

Time : Three Hours Maximum : 100 Marks

I. (a) Discuss the relationship of DFT to other transforms.

(b) Discuss on wavelet transforms.

(c) Obtain the direct form I and II realisation for the system defined by

$$H(z)=\left[1-0.28z^{-1}+\left(\frac{2}{8}\right)z^{-2}\right]\left[1-\frac{1}{8}z^{-1}-0.5\,z^{-2}\right]$$

(d) Explain signal flow graphs using suitable example.

(e) Use the backward difference for the derivative and convert the analog fitter with system function

$$H(s)=\frac{1}{s^2+16}.$$

(f) Explain the frequency sampling method of designing FIR filter.

(g) Write notes on pipelining.

(h) Explain the concept of extended parallelism.

(8 × 5 = 40 marks)

II. (a) State and prove the properties of DFT.

Or

(b) Given $x(n)=\{0,1,2,3\}$ find X (k) using DIT FFT algorithm.

III. (a) Discuss the effects of "quantisation" and "rounding off" in the performance of digital filters.

Or

(b) (i) Explain about limit cycle Oscillations.

(ii) A digital system is defined by the difference equation

$y(n) = 0.9y(n-1) + x(n)$ with

$x(n) = 0$ and initial condition

$y(\lambda) = 12$. Find the dead band of the system.

Turn over

IV. (a) A low pass filter is to be designed with the following desired frequency response

$$H_d\left(e^{jw}\right)=\begin{cases} e-jw, & -\pi/4 \le w \le \pi/4 \\ 0 & \pi/4 < |w| \le \pi \end{cases}$$

Find the filter coefficients $h_d(n)$ if the window function is defined as

$$w(n)=\begin{cases} 1 , & 0 \le n \le 4 \\ 0 , & \text{otherwise} \end{cases}$$

Or

(b) Find H (z) using impulse invariant technique for the analog system function

$$H(s)=\frac{1}{(s+0.5)(s^2+0.5s+2)}$$

V. (a) Explain briefly the computer architectures for signal processing.

Or

(b) Explain briefly on :

(i) General purpose DSP processors.

(ii) FFT processors.

(4 × 15 = 60 marks)