D 50607 (Pages : 2)

Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION NOVEMBER 2013

EC 09 501—DIGITAL SIGNAL PROCESSING

Time : Three Hours Maximum : 70 Marks

Part A

Short answer questions.

1. Write the expressions of Discrete Fourier series analysis and synthesis pair.
2. How is the efficiency of the computation of DFT improved ?
3. What is meant by round-off effects in digital filters ?
4. Write the Bartlett window function.
5. What is extended parallelism ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

1. Determine the DFT of the sequence :

$$x(n)=\begin{cases}1/4, & \text{for } 0\le n\le 2\\ 0, & \text{otherwise}\end{cases}$$

2. Explain overlap-add method with example.
3. Draw the signal flow graph for the first order difference equation given by

$$y(n)=ay(n-1)+x(n)+bx(n-1).$$

4. Explain the effect of truncation for two's complement negative numbers.
5. For the analog transfer function :

$H(s)=\dfrac{1}{(s+1)(s+2)}$. Determine H (*z*) using impulse invariant technique. Assume T = 1 sec.

6. Explain the working of accumulator.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *the questions.*

1. Given $x(n)=\{0,1,2,3,4,5,6,7\}$, find $x(k)$ using DIT FFT algorithm.

Or

2. Find linear convolution of $x(n)=\{1,2\}$ and $h(n)=\{1,2,4\}$ using circular convolution.

3. Realize the following IIR system function in direct form-I and direct form-II :

$$H(z)=\frac{1}{\left(1-az^{-1}\right)\left(1+bz^{-1}\right)}$$

Or

4. Explain product quantization noise model and derive the product quantization noise model for cascaded 2nd order IIR system.

5. State and explain alternation theorem.

Or

6. Design a digital Butterworth filter to meet the constraint :

$$0.8\le\left|H\left(e^{jw}\right)\right|\le 1, 0\le w\le 0.2\,\pi$$

$$\left|H\left(e^{jw}\right)\right|\le 0.2, 0.26\pi\le w\le\pi$$

7. Explain 2nd design iteration in FFT processor with example.

Or

8. Draw the block diagram of single-bus architecture TMS processor and explain the operation.

(4 × 10 = 40 marks)