SVKM's NMIMS
MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT & ENGINEERING

Programme: B. Tech (COMP) Year: III Semester: V
Batch: 2013-14

Academic Year: 2014-2015

Subject: **Digital Signal Processing**

Date: 09/06/2015

Marks: 100
Time: 10.00 am to 1.00 pm
Durations: 3 (hrs)

Re-Examination

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

1. Question No. 1 is compulsory.
2. Out of remaining questions, attempt any 4 questions.
3. In all 5 questions to be attempted.
4. All questions carry equal marks.
5. Answer to each new question to be started on a fresh page.
6. Figures in brackets on the right hand side indicate full marks.

Q1 Attempt any **FOUR** (Five marks each)

a. Compute 4 point DFT using DIT –FFT algorithm for **x(n) = {0,1,2,3}** — 5

b. Differentiate between Continuous time and discrete time signals. — 5

c. Compare IIR and FIR filters — 5

d. Explain ROC. State the properties of ROC of Z- Transform — 5

e. State and Prove shifting properties of DFT. — 5

Q2 **a.** Explain the steps involved in designing a Chebyshev low pass IIR filter. — 10

b. Implement the cascade and Direct form II structure realization of — 10

$y(n) = -0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2)$

Q3 Find y(n) = x(n) * h(n); using overlap add method, where; — 20

X(n) = {1,2,-1,2,3,-2,-3,-1,1,1,2,-1} and y(n) = {1,2}

Compare the result with overlap and save method.

Q4 Compute eight point DFT of the sequence — 20

$x(n) = 1;\ 0 \le n \le 7$

$0;$ otherwise

By using DIF-FFT algorithm

Q5 Design a filter with — 20

$H_d(e^{jw}) = 3\, e^{-j3w};\ -\pi/4 \le w \le \pi/4$

$= 0;\quad \pi/4 \le w \le \pi$

Use hamming window with N=7

Q6 For the given specifications design an analog Butterworth filter: — 20

$0.9 \le |H(j\Omega)| \le 1$ for $0 \le \Omega \le 0.2\pi$

$|H(j\Omega)| \le 0.2$ for $0.4\pi \le \Omega \le \pi$

Q7 **a.** Determine the inverse z-transform by the partial fraction expansion method: — 10

$X(z) = \frac{z+2}{2z^2-7z+3}$, if ROC are (i)$|z| > 3$ (ii) $|z| < 1/2$ (iii) $1/2 < |z| < 3$

b. Explain and discuss the following properties of Z transform — 5

(i) Initial Value Theorem (II)Convolution in time domain

c. Explain Causality and Stability for a LTI system. — 5