*Total No. of Questions : 8]* *[Total No. of Printed Pages : 2*

**Roll No.....**

# MEVD-104

## M.E./M.Tech. I Semester

Examination, December 2017

## Digital Signal Processing

***Time : Three Hours***

***Maximum Marks : 70***

***Note:*** i) Answer any five questions.
ii) All question carry equal marks.

1. a) Discuss sampling and reconstruction of low pass signal.
   b) The accumulator described by the function

$$y(n) = \sum_{k=-\infty}^{n} x(k) = x(n) + x(n-1) + x(n-2) + \ldots$$

is excited by the sequence $x(n) = nu(n)$. Determine its output under the condition that

i) It is initially relaxed [ $y(-1) = 0$]

ii) Initially $y(-1) = 1$.

2. a) Determine the Z-transform of the following signals.

i) $x(n) = n(-1)^n u(n)$

ii) $x(n) = (-1)^n \left( \cos \frac{\pi}{3} n \right) u(n)$

   b) Determine the response of the system

$$y(n) = \frac{5}{6} y(n-1) - \frac{1}{6} y(n-2) + x(n)$$

to the signal $x(n) = \delta(n) - \frac{1}{3}\delta(n-1)$







3. Determine the causal signal $x(n)$ if its Z-transform X(z) is given by:

a) $X(z) = \frac{1 + 3z^{-1}}{1 + 3z^{-1} + 2z^{-2}}$

b) $X(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 + 4z^{-1} + 4z^{-2}}$

c) $X(z) = \frac{1 - az^{-1}}{z^{-1} - a}$

d) $X(z) = \frac{z^{-6} + z^{-7}}{1 - z^{-1}}$

4. a) State and prove any four properties of discrete Fourier transform.
   b) Explain divide and conquer approach of FFT.

5. a) Discuss the design of linear phase FIR filter using frequency sampling method.
   b) Discuss Park-McClellan's method.

6. Discuss about Butter worth approximation of designing IIR digital filter.

7. a) Discuss about transforms for high speed using pipe lining.
   b) Discuss the design of programmable DSP's.

8. Write short notes on any two of the following.
   a) Bilinear transformation method for IIR filter
   b) Radix –4 FFT
   c) Elliptic approximation for IIR filter

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