Code: EC6T4, EM6T1, EE6T6

III B.Tech - II Semester – Regular Examinations – April 2016

DIGITAL SIGNAL PROCESSING
(Common for ECE, ECM, EEE)

Duration: 3 hours   Max. Marks: 70
Answer any FIVE questions.   All questions carry equal marks

1. a) Check the stability and causality of the given system
   difference equation $y(n) - y(n-1) = x(n) + x(n-1)$ 7 M

   b) Calculate the natural response of the system described by
   $y(n) - 4y(n-1) - 12y(n-2) = x(n)$. y(-1) =1, y(-2)=2   7 M

2. a) Verify the stability of the system given by
   $y(n) - (1/12)y(n-1) - (1/12)y(n-2) = x(n)$ 7 M

   b) Determine the cascade realization of the system described
   by $y(n) + y(n-1) - (1/4)y(n-2) = x(n)$. Discuss the stability
   of the system.   7 M

3. a) Given $x(n) = \{1, 5, 6, 1\}$. Calculate $y(n) = DFT(x((n-3))_6)$.
                                                              7 M

   b) Derive Time reversal and conjugate properties of DFT.
                                                              7 M

4. a) Calculate the 8- point DFT of the sequence
$x(n) = \{1, -2, \underset{\uparrow}{4}, 3, 5\}$ using DIT algorithm.   10 M

b) Calculate y_1 and y_2 of the Figure-1 given below.   4 M
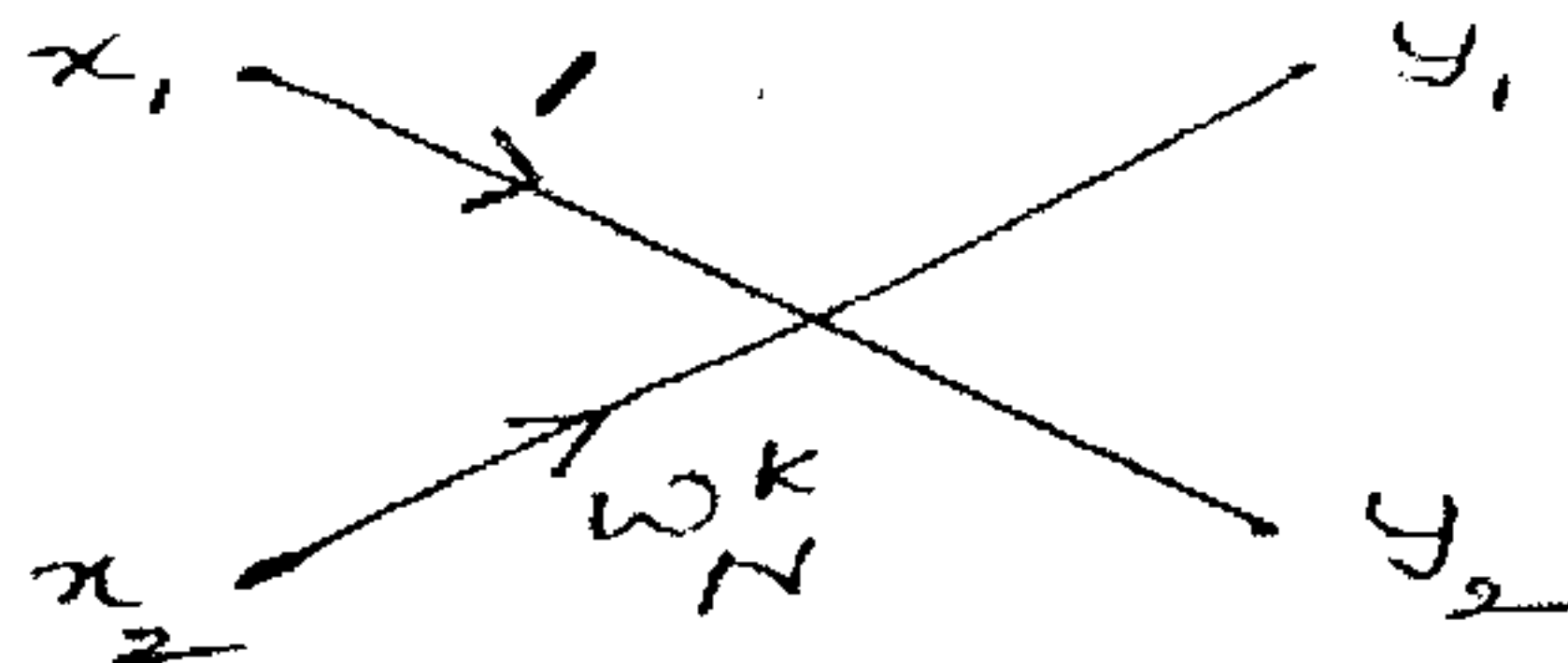

Figure-1

5. Design a digital Butter worth filter that satisfies the following constraint using bilinear Transformation. Assume

$T = 1$ sec $0.9 \le H(e^{jw}) \le 1$ $0 \le w \le \dfrac{\pi}{2}$

$H(e^{jw}) \le 0.2$ $\dfrac{3\pi}{4} \le w \le \pi$ 14 M

6. The desired response of a High pass filter is

$H(e^{jw}) = e^{-3jw}$ $\dfrac{\pi}{4} \le |w| \le \pi$

$= 0$ $\dfrac{-\pi}{4} \le w \le \dfrac{\pi}{4}$.

Determine $H(e^{jw})$ for M $=11$ using Fourier series Method.   14 M

7. Derive the relationship between input and output of a down sampler in Z-domain and Frequency domain. 14 M

8. Explain the applications of Digital Signal Process with suitable examples. 14 M