St.Joseph's College of Engineering
St.Joseph's Institute of Technology
Assignment IV
CS2403 DIGITAL SIGNAL PROCESSING/IT6502 DIGITAL SIGNAL PROCESSING

PART A

1. Compare different form structures of filter realization from the point of view of speed and memory requirement.
2. What is the importance of Windowing?
3. In what cases FIR filters will be preferred over IIR filters?
4. What are the essential features of a good window for FIR filters?
5. What is Gibb's Oscillation? (or) State the effect of having abrupt discontinuity in frequency response of FIR filters.
6. What are the disadvantages of FIR filter?
7. What are the characteristic feature of FIR filter?
8. What do you understand by linear phase response of the filters?

PART B

1. a) Obtain a cascade realization using minimum number of multiplications for the system.

$$H(z) = \left(1+\frac{1}{4}z^{-1}+z^{-2}\right)\left(1+\frac{1}{8}z^{-1}+z^{-2}\right).$$

b) Realize the system function.

$$H(z) = 1+\frac{2}{4}z^{-1}+\frac{3}{8}z^{-2}+\frac{3}{4}z^{-3}+\frac{7}{2}z^{-4}$$

by using direct form structure.

2. Design an ideal band reject filter with a desired frequency response

$$H_d(e^{j\omega}) = 1 \quad \text{for} \quad |\omega| \le \frac{\pi}{3} \text{ and } |\omega| \ge \frac{2\pi}{3}$$

$$= 0 \text{ otherwise}$$

Find the value of h(n) for N = 7 and also find H(z) using blackman window.

3. Determine the coefficients of a linear phase FIR filter of length M = 15 which has a symmetric unit sample response and a frequency response that satisfies the conditions

$$H(2\pi K/15) = \begin{cases} 1 & K = 0,1,2,3 \\ 0.4 & K = 4 \\ 0 & K = 5,6,7 \end{cases}$$

4. Design the symmetric FIR low pass whose desired frequency response is given as

$H_a(w) = \{ e^{-j2\omega}$ for $|\omega| \le \omega_c$
0 otherwise

The length of the filter should be 5 and ω_c = 1 radian/sample using rectangular window.

"Whoever is careless with the truth in small matters cannot be trusted with important matters."

Albert Einstein