

FACULTY OF ENGINEERING, UNIVERSITY OF JAFFNA

DIGITAL SIGNAL PROCESSING – EC5011

LABORATORY SESSION 3 FILTER DESIGN

PRE LAB PREPARATION

INTRODUCTION

This session focuses on designing filters using Matlab software. It is initially designed and implements the filter by using Matlab software

PROCEDURE

PART1: FIR FILTER DESIGN

1. Paper work: Design a linear phase FIR filter using windowing (rectangular) method for the given specifications. The length of the filter needs to be 21. Calculate the 21 filter coefficients.
 - Sampling frequency 8000
 - Pass band frequency 1500Hz to 2000Hz
 - Stop band frequencies 0 to 1000Hz and 2500 to 4000Hz.

PART2: IIR FILTER DESIGN

1. Paper work: You are required to design a second order digital low pass filter using the following analogue transfer function.

$$H(s) = \frac{1}{s^2 + \sqrt{2}s + 1}$$

The specifications for the digital filter are:

The sampling frequency is 1.28 KHz.

3 dB cut-off frequency is 150Hz.

- a) Derive the digital filter transfer function using impulse invariant method and draw a cascade implementation of two first order systems.
- b) Derive the digital filter transfer function using bilinear transform method and draw a parallel implementation of two first order systems.

Hint: You need to take care of the warping