

2010 Paper 9 Question 7

Digital Signal Processing

- (a) Make the following statements correct by changing one word or number. (Negating the sentence is not sufficient.)
- (i) An absolutely summable discrete sequence will have in the corresponding z -transform plane at $z = 1$ a positive value. [1 mark]
 - (ii) A memory-less system depends only on the next input value. [1 mark]
- (b) Define the convolution operator on discrete sequences. [2 marks]
- (c) Prove that convolution of discrete sequences is an associative operation. [6 marks]
- (d) Given samples $x_n = x(t_s \cdot n)$ for all integers n , where $x(t)$ is a continuous signal whose Fourier transform has non-zero values only at frequencies f with $f_l < |f| < f_h$,
- (i) under which condition can the original waveform $x(t)$ be reconstructed; [4 marks]
 - (ii) and how can this be done? [6 marks]