Dr Salman

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST 3 EXAMINATIONS - May 2017

M.Tech II Semester (Electronics and Communications Engineering)

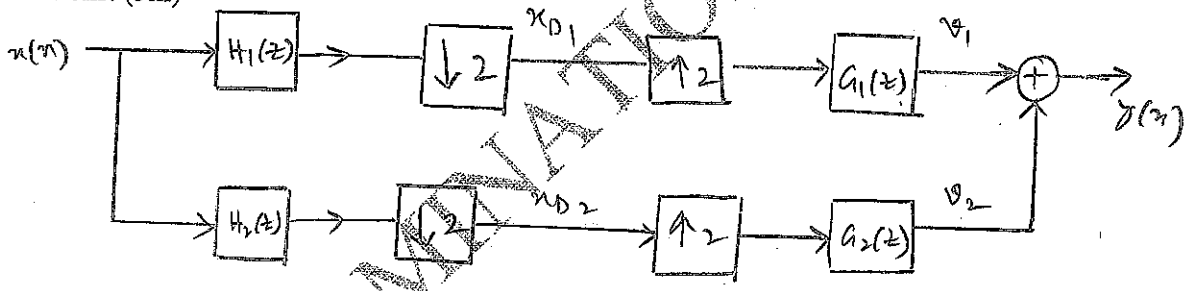
COURSE CODE: 10M11EC211 MAX. MARKS: 35

COURSE NAME: Advanced Digital Signal Processing

COURSE CREDITS: 3 MAX. TIME: 2HRS

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Assume any missing data. Marks are indicated in parenthesis.*

1. Explain about the linear prediction and its applications. (4m)
2. What is Wiener-Khinchine relationship? Explain in detail about the power spectrum estimation using parametric and non-parametric methods. (6m)
3. Derive the condition for the following system for perfect reconstruction. If this system has been assumed to be a quadrature mirror filter with $H_1(z) = \frac{1}{2}(1+z^{-1})$, derive the all other filter transfer functions. (5m)



4. Explain about the poly-phase decomposition of order M for a filter with impulse response $h(n)$. Explain about the use of poly-phase decomposition with respect to interpolation by a factor I and decimation by a factor D in multi-rate digital signal processing (Two identities). (5m)
5. Draw the 4-point DFT calculation butterfly diagrams that use the radix-2 FFT algorithms for decimation in time domain and decimation in frequency domain. (4m)
6. Draw all the possible block diagrams for the transfer function $H(z) = \frac{(1+0.25z^{-1})}{(1+0.5z^{-1})}\frac{(1-2z^{-1})}{(1-0.125z^{-1})}$. (5m)
7. Describe the following briefly.
   a. Draw the diagram relating all the Fourier transform pairs with proper equations. (2m)
   b. Nyquist sampling theorem. (1m)
   c. Windowing and its consequences. (1m)
   d. List only the methods of FIR and IIR filer designs. (2m)