FOURTH SEMESTER B.TECH DEGREE EXAMINATION

13.404 DIGITAL SIGNAL PROCESSING (TA)

MODEL QUESTION PAPER

Time: 3 hours Maximum marks: 100

PART-A

(Answer all questions. Each question carries 2 marks)

1. Given the sequence y[n] = [1, 2, 1, -1,-2, 2], suggest a suitable value of N for computing DFT. Plot z[n] = IDFT(X(k)) for the suggested value of N.
2. Find the DFT coefficient X(2) for x(n)=(1,2,3,4) without finding DFT directly using equations.
3. The first five points of the eight point DFT of a real valued sequence are (0.2,0.8-j0.5,0,0.3-j0.78,0). Find the remaining three points.
4. Draw the pole positions of a Butterworth filter for N=3. Write the corresponding transfer function.
5. Do you think ideal filter is practically realizable? If not, draw the magnitude characteristics of a physically realizable filter.
6. Which of the following systems are FIR? Justify.
   (a) $H(z) = 1 + 2.88z^{-1} + 3.405z^{-2} + 1.74z^{-3} + 0.4z^{-4}$
   (b) $y[n] = 0.75y[n-1] + 0.125y[n-2] + x[n] + 0.66x[n-1]$
   (c) $y[n] = x[n] + 2x[n-1] + 3x[n-2] + 2x[n-3] + x[n-4]$
7. Differentiate product quantization error from coefficient quantization error.
8. How many additions, multiplications and memory locations are required to realize a system H(z), having M zeroes and N poles in Direct Form – II.
9. Write down the time domain representations of up sampled and down sampled signals.
10. List out any two features of a typical dsp processor, that distinguishes it from a general purpose microprocessor.

[10*2 =20 marks]

Dr. B. Azhikannan