Code No. BTS 018(C)

B.TECH DEGREE VII SEMESTER EXAMINATION IN ELECTRONICS AND COMMUNICATIONS ENGINEERING APRIL 2000
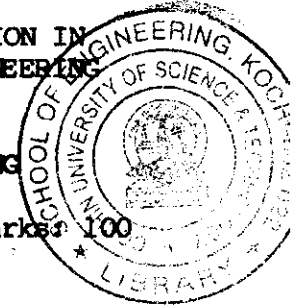
EC 701 DIGITAL SIGNAL PROCESSING

Time: 3 Hours   Maximum Marks: 100

(Answer ALL questions)
(All questions carry EQUAL marks)

I. (a) A system responds to an impulse sequence by producing a sequence $h(n)$ given by
$h(n) = 1$ for $-2 \le n \le 2$
If a sequence $X(n) = 1$ for $-1 \le n \le 1$ is applied as input to this system. Determine the output the sequence.   (10)

(b) Prove that the convolution of two sequence in the time domain is equivalent to the product of their fourier transforms in the frequency domain.   (10)

OR

II. (a) Explain the 'overlap add' method of block convolution procedure and the role of DFT in its implementation.   (10)

(b) Explain how the predition of output of a system can be done, given its impulse response. Also, explain how the impulse response can be used to predit stability of a system.   (10)

III.(a) Describe the methods employed for the realization of FIR filters.   (10)

(b) Illustrate the concept of DIT FFT algorithm. Explain how it can be employed to find the inverse DFT.   (10)

OR

IV. (a) Define causality and seperability with reference to a 2-D system. (10)

   (b) List out the advantages of digital filters over analog filters. (10)

V. The difference equation of a first-order system is given by $y(n) = a. y(n-1)+x(n)$ where $a = \frac{1}{2}$. Only finite length registers of 4-bits are available for storage. Calculate the impulse response of the system and explain the effect of the finite length register. (20)

OR

VI. (a) Discuss and compare fixed point, floating point and block floating point arithmetic. (8)

   (b) Explain the need for truncation and rounding in recursive structures and how they are accomplished. (12)

VII.(a) Describe the method of generating random numbers. (8)

   (b) Discuss about special purpose hardware used for FFT. (6)

   (c) Compare radix-2 and radix-4 FFTs. (6)

OR

VIII. Write notes on:

   (a) Butterworth digital filters. (10)

   (b) Chebyshev filters. (10)

IX. (a) Design a low pass digital filter with the following data :

   Cut off frequency = 6 kHz
   Transmission frequency = 8.8 kHz
   Maximum pass band attenuation = 1 dB
   Minimum stop band attenuation = 30 dB
   Sampling frequency = 32 kHz (12)

   (b) Compare the performance of FIR and IIR filters. (8)

OR

X. (a) Describe the architecture and organisation of any DSP chip. (12)

   (b) Discuss about the applications of DSP in image processing. (8)

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