



- Notes :
1. All questions carry marks as indicated.
  2. Answer **any five** questions.
  3. Assume suitable data wherever necessary.
  4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) State and prove the properties of DFT. 7  
 b) Perform the circular convolution of the following sequence using DFT and IDFT method. 7  
 $x_1(n) = \{1, 1, 0, 1\}$ ;  $x_2(n) = \{1, 2\}$
2. a) If  $x(n) = nN$  and  $N = 8$  find  $x(k)$  using DIT-FFT algorithm. 7  
 b) Compare the complex multiplication and addition in between DFT and FFT. 7
3. a) Find the z-transform and sketch ROC for  $x(n) = (a^n + a^{-n})\mu(n)$ . 6  
 b) List the three well known methods of designing techniques for FIR filter and explain any one. 8
4. a) Compare various windows used in design of FIR filters. 6  
 b) Explain the design procedure for IIR filter using Chebyshev and Butterworth approximations. 8
5. a) Explain how filter banks are used in speech processing by a machine. 7  
 b) What are the effects of finite word length in digital filters? 7
6. a) States the features of TM5320C5X DSP processor. Explain pipeline and parallel processing in DSP processor. 7  
 b) Design a linear phase FIR band pass filter to pass frequencies in the range  $0.4\pi$  to  $0.65\pi$  rad/sample by taking 9 samples of Hanning window. 7
7. a) Explain in detail the AR, MA model in DSP. 7  
 b) What is multi rate signal processing? Discuss about the sampling rate conversion by factor of I/D. 7
8. a) Derive the transfer function of decimator. 7  
 b) Explain LMS algorithm with neat diagram and relevant equation. 7

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