BT-5/D-23   45246

DIGITAL SIGNAL PROCESSING
EC-309A

Time : Three Hours]   [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) For the system described by $y(n) = x(n)\, x(n-2)$, check whether it is static/dynamic, causal/noncasual, linear/non-linear and time invariant/time variant. **10**

   (b) State and prove the time shifting property of Z-transform. **5**

2. (a) Differentiate between minimum phase and maximum phase systems. **8**

   (b) Discuss the applications of Z transform with suitable examples. **7**

Unit II

3. (a) What do you mean by the term "bit reversal" as applied to FFT ? What are the advantages of FFT algorithm over direct computation of DFT ?   10

    (b) Find the DTFT of a sequence $x(n) = a^n u(n)$.   5

4. (a) How will you develop a cascade structure with direct form II realization of a sixth order IIR transfer function ?   10

    (b) Realize an FIR filter with impulse response is given by :   5

$$h(n) = (1/2)^n [u(n) - u(n - 5)]$$

Unit III

5. Explain the method of designing a linear-phase FIR filter using windows with supporting mathematical expressions. What are the characteristic features of FIR filters ?   15

6. (a) What is the necessary and sufficient condition of linear phase FIR filter ?   7

    (b) What do you understand by linear phase response in filters ? Also discuss alternation theorem.   8

Unit IV

7. Write the design procedure for butterworth filter and Chebeshev filter. **15**

8. (a) Compare bilinear transformation and other transformations based on their stability. **8**

   (b) Discuss the design of IIR filters in frequency domain. **7**