

M.E. First Semester (Electronics & Tele.) (Full Time) (C.G.S. - New)
13334 : Digital Signal Processing and Applications : 1 ENTC 4

P. Pages : 2

Time : Three Hours



AU - 3460

Max. Marks : 80

- Notes :
1. Answer **three** question from Section A and **three** question from Section B.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION - A

1. a) State the advantages and disadvantages of digital filters. Compare it with analog filters. 7
b) Explain the following terms as applied to analogue and digital filters: 7
 - i) Phase delay
 - ii) Group delay
 - iii) Linear phase
 - iv) Minimum phase
2. a) State and explain the principles of Type-I, Type-II, Type-III and Type-IV FIR filters. 7
b) Describe inverse Chebyshev filters? 7
3. a) Explain in brief the Hilbert transforms and its applications. 6
b) Explain optimum equiripple FIR filter design with related theorem. 7

OR

4. Design an ideal L.P.F. whose desired frequency response 13
$$H_d(e^{j\omega}) = 1 \quad \pi/3 \geq \omega \geq -\pi/3$$
$$0 \quad \pi/3 \geq |\omega| \geq \pi/3$$
Using Hamming Window
 - i) Determine the impulse response for $N=9$
 - ii) Determine $H(z)$.
5. a) For the analog transfer function 7
$$H(s) = \frac{0.8}{s^2 + 1.6s + 9.64}$$
Determine $H(z)$ using Bilinear transformation
If i) $T = 1$ sec and ii) $T = 0.6$ sec.
b) What is warping effect? What is its effect on magnitude and phase response? 6

OR

6. Design a digital Butterworth low pass filter whose transfer function is given by 13
$$0.7 \leq |H(e^{j\omega})| \leq 1 \quad 0 \leq \omega \leq 0.2\pi$$
$$|H(e^{j\omega})| \leq 0.3 \quad 0.6 \leq \omega \leq \pi$$
Using impulse-invariant-transformation.

SECTION - B

7. a) Obtain the polyphase decomposition of the IIR system with transfer function. 7
$$H(z) = \frac{1 - 4z^{-1}}{1 + 5z^{-1}}$$

- b) What is quadrature mirror filter bank? Explain analysis and synthesis bank. 7

OR

8. a) Explain with block diagram the general polyphase framework for decimators and interpolators. 7

- b) Derive an expression for the spectrum of output signal of an interpolator. 7

9. a) Explain the different addressing modes of DSP processor TMS320C6713. 7

- b) Explain the role of DSP in Radar systems. 6

OR

10. a) Explain the pipeline operations in DSP processor TMS320C6713. 6

- b) Explain in detail the short time Fourier analysis for speech signals. 7

11. How time-frequency analysis can be performed with the help of wavelet transform? Also state its properties. 13

OR

12. a) Prove the orthogonality relations of Daubechies wavelets. 6

- b) Discuss briefly the various applications of wavelet transforms. 7
