M.E. First Semester (Electronics & Tele.) (Full Time (C.G.S.- New)

13334 : Digital Signal Processing and Applications : 1 ENTC 4

P. Pages : 2 | **AW - 3900**

Time : | Max. Marks : 80

* 0 4 1 7 *

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) What are the possible types of impulse for linear phase FIR filter? What are the conditions to be satisfied for constant phase delay in linear phase FIR filters. **7**

b) State the advantage and disadvantage of digital filter. Compare it with analog filter. **6**

OR

2. a) Derive the expression to determine the poles of butterworth filter. **7**

b) Describe Inverse Chebyshev Filter. **6**

3. a) Explain the procedure for designing FIR filter using windows. **7**

b) Discuss equiripple linear phase FIR filter. **6**

OR

4. Design an ideal low pass filter whose desired frequency response **13**

$$Hd(e^{j\omega}) = 1, \quad \pi/3 \geq \omega \geq -\pi/3$$

$$= 0, \quad \pi \geq \omega \geq \pi/3$$

using Hamming window

i) Determine the impulse response for N = 9.

ii) Determine H(Z).

5. Explain the design of IIR filter using Impulse Invariant Technique. What is pole mapping? Give the steps to design digital filter using Impulse Invariant method. **13**

OR

6. a) Determine H(Z) for a Butterworth filter satisfying the following specification **8**

$$0.8 \leq |H(e^{j\omega})| \leq 1; \quad 0 \leq \omega \leq \pi/4$$

$$|H(e^{j\omega})| \leq 0.2; \quad \pi/2 \leq \omega \leq \pi$$

Assume T = 0.1 sec.

Apply Bilinear transformation method.

b) What is bilinear transformation. Give its properties, advantage and disadvantage. **5**

SECTION – B

7. a) Explain in detail all the identities of multirate DSP? 7

   b) Explain with block diagram the general polyphase framework for decimator and interpolator. 7

OR

8. a) The T.F. of an IIR filter is 7

$$H(Z) = \frac{1 + 0.32Z^{-1} + 0.58Z^{-2}}{1 + 0.7Z^{-1} + 0.4Z^{-2}}$$

   perform polyphase decomposition of H(Z) to decompose into

   i) 2 – section

   ii) 4 – section

   b) What are the error in QMF filter bank? Explain how alias free QMF realization is achieved. 7

9. a) Explain different addressing modes of DSP Processor TMS 320 C 6713. 7

   b) Differentiate between Van – Neumann and Harvard Architecture. 7

OR

10. a) Explain the pipeline operations in DSP Processor TMS 320 C 6713. 7

    b) Write any 4 special instructions of TMS 320 C 67XX processor that are suitable for signal processing application and explain them. 7

11. a) Discuss briefly the various applications of wavelet transform. 6

    b) Prove "If f(t) has continuous wavelet transform given by $CWT_f(a,b)$ then $f'(t) = f(t - b')$ leads to the following transform 7

$CWT_{f'}(a,b) = CWT_f(a, b - b')$ "

OR

12. a) Explain the various steps to compute continuous wavelet transform of a given signal. 7

    b) Prove the orthogonality relation of Daubechies wavelet. 6

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