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 - 3629

Time : Three Hours | Max. Marks : 80

* 0 6 7 3 *

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 and explain the principles of Type – I, Type – II, Type – III and Type – IV FIR filters. **7**

b) State the advantages and disadvantages of digital filter. Compare it with analog filter. **6**

**OR**

**2.** a) Explain the following terms as applied to analogue and digital filters: **7**
i) Phase delay ii) Group delay
iii) Linear phase iv) Minimum phase

b) Derive the expression to determine the poles of Butterworth filter. **6**

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

b) Explain in brief the Hilbert transforms and its applications. **6**

**OR**

**4.** The desired frequency response of a low – pass filter is **13**

$$H_d(e^{jw}) = \begin{cases} 1, & -\pi/2 \le w \le \pi/2 \\ 0, & \pi/2 \le |w| < \pi \end{cases}$$

Determine $h_d(n)$. Also determine h(n) using the symmetric rectangular window with window length = 7.

**5.** a) What is warping effect? What is its effect on magnitude and phase response? **6**

b) For the analog transfer function $H(s) = \dfrac{1}{(s+1)(s+2)}$ **8**

determine H(z) using impulse invariant technique. Assume T = 1 sec.

**OR**

6. Design a digital Butterworth filter that satisfies the following constraint using bilinear transformation. 14

Assume T = 1 sec.

$0.9 \leq |H(e^{jw})| \leq 1 \quad 0 \leq w \leq \pi/2$

$|H(e^{jw})| \leq 0.2 \quad 3\pi/4 \leq w \leq \pi$

## SECTION – B

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

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

**OR**

8. Derive the input – output relation for an uniform DFT synthesis filter bank with 14
i) Type – I decomposition and
ii) Type – II decomposition.

9. a) Explain Von Neumann and Harvard architectures and explain why the Von Neumann architecture is not suitable for DSP operations. 7

b) Explain the pipeline operations in DSP processor TMS320C6713. 6

**OR**

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

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

11. a) Prove the orthogonality relation of Daubechies wavelet. 6

b) State and explain the important properties of CWT. 7

**OR**

12. a) Discuss briefly the various applications of wavelet transforms. 8

b) How can better resolution be obtained through wavelet transform? 5

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