M.E. First Semester (Digital Electronics) (Part Time / Full Time) (C.G.S.- New)

13202 : Advanced Digital Signal Processing : 1 UMEF 2

P. Pages : 2 | **AW - 3485**

Time : Three Hours | Max. Marks : 80

Notes : 1. Due credit will be given to neatness and adequate dimensions.
2. Assume suitable data wherever necessary.
3. Illustrate your answer necessary with the help of neat sketches.
4. Use of pen Blue/Black ink/refill only for writing the answer book.

1. a) Describe with appropriate diagrams: **7**

i) Overlap-save method

ii) Overlap-add method

b) Compute 8 point Decimation in time FFT of signal $x(n) = n$, for $0 \le n \le 3$ **7**

OR

2. a) Find the Discrete Time Fourier Transform of the following finite duration sequence of length L. **7**

$$x(n) = \begin{cases} A, & 0 \le n \le L-1 \\ 0, & \text{otherwise} \end{cases}$$

b) Derive time band width relationship of a deterministic signal. **7**

3. a) Derive the expression for IIR filter design by using Bilinear Transformation method. **6**

b) The system function of an analog filter is given by **7**

$$H_a(s) = \frac{S+0.2}{(S+0.2)^2+9}$$

Convert analog filter into digital filter using impulse invariant technique, assuming T=1 sec.

OR

4. a) What is Hamming window function? Obtain its frequency domain characteristics. **7**

b) Explain the procedure for design FIR filter using frequency sampling techniques. **6**

5. Design a linear phase FIR digital filter for the specifications given below using two stage multi-rate structure. **13**

Pass band : $0 \le F \le 60$, Transition band : $60 \le F \le 65$

Ripple : $\delta_1 = 10^{-1}, \delta_2 = 10^{-3}$, Sampling rate : 10000 Hz

OR

6.		What is quadrature mirror filter bank? Explain analysis and synthesis bank. Also write a brief note alias free filter bank.	13
7.	a)	Illustrate and explain adaptive implementation of Wiener filters.	7
	b)	What do you understand by adaptive RLS Lattice filters? Explain.	7

OR

8.	a)	Determine the range of values of step size Δ to ensure the stability of the algorithm in the mean-square error sense for the normalized LMS algorithm.	7
	b)	Explain an adaptive noise cancellation system with an example.	7
9.	a)	Give the Properties of Gabor Transform and explain its applications.	6
	b)	What is Hilbert transform & explain its applications.	7

OR

10.	a)	Give some properties of Short Term Fourier Transform & explain its applications.	6
	b)	State and prove the properties of 2D-Discrete Fourier Transform.	7
11.	a)	Draw the architecture of TMS320C67XX and explain the function of each block.	6
	b)	Give the architecture of SIMD Machine useful for digital signal processing and explain its advantages.	7

OR

12.		Explain how Harvard architecture as used by the TMS 320 family differs from the strict Harvard architecture. Compare this with the architecture of a standard Von-Neumann processor.	13

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