Hall Ticket Number:

Code No. : 21512

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

M.E. (ECE: CBCS) I-Semester Main Examinations, January-2019

(Communication Engineering & Signal Processing)

Advanced Digital Signal Processing

Time: **3** hours Max. Marks: **60**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Q.No.	Stem of the question	M	L	CO	PO
	Part-A (10 × 2 = 20 Marks)				
1.	What is the advantage of Goertzel algorithm to compute FFT? Mention a practical application of it.	2	1	1	1
2.	Find the number of additions, multiplications and memory locations required for direct form II realization of an IIR digital filter transfer function having numerator polynomial of order M and denominator polynomial of order N.	2	1	2	1
3.	List the advantages of Multirate Signal Processing.	2	1	3	1
4.	List the conditions in terms of analysis and synthesis filters for alias free and perfect reconstruction of two channel QMF bank.	2	4	4	3
5.	How do you find approximation coefficients in DWT?	2	1	5	1
6.	Explain dilation equation using scaling and wavelet coefficients.	2	1	5	1
7.	Compare the computational complexity of LMS and RLS algorithms for adaptive filters.	2	4	6	1
8.	Find first order optimal predictor coefficients and minimum mean square error for a real WSS process with autocorrelation sequence $\gamma_{xx}(0) = 0.1482, \gamma_{xx}(1) = 0.05$.	2	1	6	3
9.	List the performance measures for power spectrum estimator.	2	1	7	1
10.	Give the advantages of parametric methods over non-parametric methods for power spectrum estimation.	2	1	7	1
	Part-B (5 × 8 = 40 Marks)				
11. a)	Compute the linear convolution of the following two sequences $x_1(n) = (3,2,1,2)$ and $x_2(n) = (1,2,1,2)$.	3	1	1	1
b)	Develop a lowpass Butterworth digital filter with 3dB cutoff frequency at 50Hz and attenuation of at least 10dB for frequency larger than 100Hz. Sampling frequency: 500Hz.	5	3	2	1
12. a)	Develop a two-stage decimator to convert a single bit stream at 3072 kHz into a multi-bit stream at 48 kHz. for which the pass band and stop band ripples for the decimator are 0.001 and 0.0001, respectively. The pass band ranges from 0-20kHz.	5	3	3	2
b)	Consider a two channel QMF bank with the analysis and synthesis filters given by $H_0(z) = 2 + 6z^{-1} + z^{-2} + 5z^{-3} + z^{-5}$, $H_1(z) = H_0(-z)$; $G_0(z) = H_0(z)$; $G_1(z) = -H_1(z)$. Examine the QMF bank for alias-free and perfect reconstruction.	3	4	4	1

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