APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

08 PALAKKAD CLUSTER

Q. P. code :CSP0817131-J **(pages: 2)** **Name.....**

Reg No.....

FIRST SEMESTER M. TECH. DEGREE EXAMINATION DEC 2017

08EC6531/08EC6231 ADVANCED DIGITAL SIGNAL PROCESSING

Branch: Electronics & Communication Engineering

(Common to CESP & ECE)

Time: 3 Hours **Max Marks: 60**

Answer all six questions. Part 'a' of each question is compulsory

Answer either part 'b' or part 'c' of each question

Module I

1.

(a) Explain ideal features of a window function 3

(b) Discuss the effects of finite word length of registers on digital FIR filter 6

Or

(c) Design a digital FIR filter with the following frequency response using hanning window. Use N=11

$$H_d(e^{jw}) = 1 \text{ for } 0.25\pi \leq |w| \leq \pi$$
$$= 0 \text{ for } |w| = 0.25\pi$$

6

Module II

2.

(a) Derive the expression for the order of a butterworth filter 3

(b) Locate the poles of a butterworth filter transfer function for the order N=4 and obtain the butterworth polynomial 6

Or

(c) Design a digital chebyshev low pass filter with α_p= 1dB ripple in pass band $0 \leq w \leq 0.2\pi$, α_s=15 dB ripple in stop band $0.3\pi \leq w \leq \pi$ using bilinear transformation 6

Module III

3.

(a) Differentiate up sampling and down sampling with an example 3
(b) Discuss the design of interpolators in detail 6

Or

(c) Discuss the time domain and frequency domain analysis of decimator 6

Module IV

4.

(a) Explain any two properties of autocorrelation function 3
(b) Explain modified periodogram for power spectral estimation 6

Or

(c)Derive the expression for variance in Welch method for power spectral estimation 6

Module V

5.

(a) Compare parametric and non parametric methods of power spectrum estimation. List the different methods of each case 4
(b) Derive Yule Walker equations 8

Or

(c) Compare ARMA, MA and AR models 8

Module VI

6.

(a) Differentiate stationary and non stationary signals with example 4
(b) Explain the fourier analysis of stationary random signals 8

Or

(c) Explain the fourier analysis of non stationary random signals 8