APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY

08 PALAKKAD CLUSTER

Q. P. Code : CESP0820131-I **(Pages: 2)**

Name: .....

Reg. No:.....

FIRST SEMESTER M.TECH. DEGREE EXAMINATION MARCH 2021

Branch: Electronics & Communication Engineering **Specialization: Communication Engineering & Signal Processing**

08EC6231/08EC6531 Advanced Digital Signal Processing

(Common to CESP and ECE)

Time: 2 hour 15 minutes **Max. Marks: 60**

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q.no.	Module 1	Marks
1.a	Write short notes on the use of window function with relevant equations	3
	Answer b or c	
b	Explain the effects of finite word length in FIR filter design	6
c	Design an FIR filter with, Hd (ejw) = e-j3w $-\pi/4 \le w \le \pi/4$ $= 0 \quad \pi/4 \le w \le \pi$ Using Hamming window with N=7	6

Q.no.	Module 2	Marks
2.a	Explain bilinear transformation method of conversion from analog to digital transfer function	3
	Answer b or c	
b	Design a Butterworth digital IIR highpass filter using bilinear transformation by taking T = 0.5 second, to satisfy the following specifications. $0.707 \le \lvert H(e^{jw}) \rvert \le 1.0$; for $0.65\pi \le w \le \pi$ $\lvert H(e^{jw}) \rvert \le 0.2$; for $0 \le w \le 0.45\pi$	6
c	Explain the design procedure for Low pass digital Chebyshev IIR filter.	6

Q.no.	Module 3	Marks
3.a	State and prove the noble identities in multi-rate signal processing	3
	Answer b or c	
b	Derive the equation for upsampling using factor I	6
c	Implement decimation system using a polyphase structure	6

Q.no.	Module 4	Marks
4.a	Discuss the relation between power spectral density and autocorrelation function	3
	Answer b or c	
b	Prove that periodogram is not a consistent estimate of true power density spectrum and briefly explain the significance of DFT in power spectrum estimation	6
c	Explain the estimation of power spectrum using Blackman and Tukey method	6

Q.no.	Module 5	Marks
5.a	Differentiate parametric from nonparametric power spectral estimation	4
	Answer b or c	
b	Derive the equation for Yule-Walker equation	8
c	Explain in detail about ARMA Model for power spectrum estimation	8

Q.no.	Module 6	Marks
6.a	Briefly explain the time-dependent Fourier analysis of radar signals	4
	Answer b or c	
b	Explain the Fourier analysis of speech and Radar signals.	8
c	Explain the Fourier analysis of stationary signals using a periodogram.	8